Economic Impacts of the San Onofre Nuclear Generating Station on the California Economy

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Impacts of the San Onofre Nuclear Generating Station

Introduction

The purpose of this analysis is to estimate the impacts of the San Onofre Nuclear Generating Station (SONGS) on the California economy. This will be assessed over a five-year period from 2010 through 2014 using expenditure estimates provided by the Southern California Edison Company (SCE). The information provided by SCE for use in the impact evaluation consists of workers directly employed by the plant, employee compensation, material purchases, fixed costs, and other service expenditures needed to maintain and operate the facility. The analysis here is limited to estimating the macroeconomic impact of operations and maintenance of SONGS on the California economy. The impact estimate will show how many jobs are directly created by operation and maintenance of the nuclear plant and the macroeconomic impact associated with indirect and induced effect on other economic sectors in California. The impact results will provide an estimate of output, value added, taxes and earnings generated in the California economy. Under the SCE proposal, annual spending would range between $712 million and $862 million during the five-year period. Our computations revealed that operation and maintenance of SONGS have a significant impact on the California economy creating about 9,400 jobs and more than $3.3 billion in output per year over the period under study. Each dollar spent on the operation and maintenance of SONGS produces $1.35 of labor income in the California economy, the bulk of which (77%) is employee compensation.

Study Area

To assess the economic impacts of SONGS, IHS Global Insight defined the entire state of California as the study area. While SONGS is located in San Diego County, the economic activity generated by the plant will have significant impacts across California. Most of the labor and about half of the direct material inputs needed for SONGS operations and maintenance will be obtained in-state. California is the nation's largest state economy, accounting for 13% of gross domestic product and 12% of the population; California's 2008 gross state product of $1,846.75 billion would make it about the eighth largest economy in the world, similar in size to Russia. Due to its heavy mix of high-paying service sector jobs, median household income is over $60,000 or about 17% higher than the national average.

IHS Global Insight used the IMPLAN input/output (I/O) model to estimate the total economic impacts of SONGS because its high level of sector detail enables the final demand changes to be assigned to the appropriate economic sectors. An I/O model such as IMPLAN provides for an accounting of the effects that initial direct spending in one industry has on other sectors through the inter-industry relationships in the economy. IMPLAN contains a set of multipliers that produce estimates of the total regional increases in output, value added, employment, and income produced by direct spending. IMPLAN uses national inter-industry purchasing relationships, adjusted for the structure of the regional economy through the use of regional purchase coefficients, to derive a set of sector-specific multipliers that are unique to the regional economy being analyzed. The multipliers are used to derive indirect and induced effects, which are looked at along with the direct effects to obtain the total change in regional economic activity. The sizes of the multipliers are determined by the technical co-efficients of the

production functions in the affected final demand sectors, and on the number and types of industries that supply inputs to the directly affected sectors. The construction and maintenance of energy facilities with a high output value per worker has a relatively large economic multiplier effect because of the value of inputs and the consumer spending supported by the high-wage employees.

The key assumption in this type of economic impact study is the selection of the sectors where the final demand changes will occur. In the case of SONGS employees, the sectors are detailed later in the report, which were distributed using an employee mix provided by SCE. The spending for materials was also assigned as appropriate to IMPLAN sectors in accordance with NAICS classification based on a SCE detailed material-spending breakdown. The employee compensation generated by short-term service hires was applied to the model to capture the activity supported by the disposable income.

Measurement of Economic Impacts

The maintenance and operation activity at SONGS affects a large number of sectors in the California economy. In particular, the activities create direct, indirect, and induced demand for labor leading to a high employment multiplier. When a direct increase in regional spending occurs, there are two types of economic impacts generated through backward linkages that are considered by models such as IMPLAN:

- Indirect effects are generated when a business that receives an initial, direct increase in spending purchases additional inputs from their suppliers located in the region.
- Induced effects are produced by the increase in local spending of disposable income by the newly hired workers, including both the new direct workers hired by firms receiving the initial changes in final demand (e.g., the new construction workers) and by new workers in the supplying industries (e.g., firms who sell concrete or steel to the contractor and who, in turn, have to hire new workers to meet the increased demand.)

In terms of the modeling purposes for this study, the direct purchases are based on SCE's proposed and planned expenditures. The indirect purchases are determined from within the model and are calculated utilizing a combination of IMPLAN's industry specific production functions and regional purchase coefficients[1] (RPC). Based on information provided by the SCE, it is estimated that 50% of the direct material purchases will be made within California with the rest made outside the study area. The material spending will ultimately require non-labor inputs such as steel, machinery, and equipment, some of which will be purchased within the study area, indirectly supporting employment in those activities. Additionally, the wages supported by the plant generate activity for a multitude of other service and goods-producing sectors. The backward linkages for a producing firm in a regional economy consist of the other industries from which it buys the inputs needed to make the goods and services it sells.

The higher the share of inputs that are bought from suppliers located in the regional economy, the more complete the backward linkages, which will result in larger indirect and induced effects and higher economic multipliers. When evaluating the regional economic impacts of a project, it is important that the changes in all the primary measures of regional economic activity be considered. In other words, changes in levels of output, value added, and income should be examined along with changes in employment.

[1] This is the ratio representing the portion of regional demands purchased from local producers.

We have summarized the payroll, wage, material, and other direct California expenditures estimated to be needed to maintain and operate the plant. Any expenditures or activity generated outside the state will not be included in this study. SCE expects to spend close to $4 billion from 2010 to 2014, averaging about $770 million per year. During the five-year period, general spending is highest in 2010, the first year of this plan. Jobs related to contractor work and services will vary depending on the maintenance and capital improvements scheduled each year.

Wage, Employment and Material Expenditures Estimates for SONGS
Expenditure by Asset Class (Million Dollars)

Expenditure	2010	2011	2012	2013	2014	5-Year Avg.
SCE Salaries & Payroll Adds	410.54	408.18	395.53	410.48	427.04	410.35
Contrator Wages & Salaries	164.77	83.51	56.98	53.61	77.65	87.31
Service Wages & Salaries	107.81	82.17	86.48	99.51	97.88	94.77
Other Services	70.64	53.84	56.66	65.20	64.13	62.09
Material Purchases	36.08	37.82	42.06	46.43	41.67	40.81
General/Admin Expenses	25.47	20.57	21.28	22.40	23.29	22.60
Fixed Costs	23.58	24.15	24.88	25.56	26.22	24.88
Property Taxes & Insurance	22.82	25.79	28.35	29.87	30.69	27.50
Total	861.71	736.02	712.23	753.06	788.58	770.32

Job Estimates (Full Time Equivalent)

Job Type	2010	2011	2012	2013	2014	5-Year Avg.
SCE Permanent Staffing	2,439	2,439	2,314	1,939	1,939	2,214
SCE Temporary Staffing	52	36	36	34	43	40
Contractor Staffing	1,020	506	336	308	434	521
Total	3,511	2,981	2,686	2,281	2,416	2,775

The material purchases were distributed through the IMPLAN model utilizing a detailed spending list provided by SCE. The material breakdown was then applied to each year and is relevant from the point of view of how these expenditures affect the economy of California. Investment in each material-providing industry is distributed over the entire economy due to backward linkages. Industries have different strengths in terms of creating their impact on the economy.

Since we are analyzing an existing facility, much of the impacts will be related to the jobs it supports. While material spending is significant, the bulk of SCE spending plan is allocated to wage and salary expenditures. Over the study period the plant will employ an average of 2,214 full-time workers on-site and several hundred more through contract and temporary staffing with positions that range from high-paying nuclear operators to facility support and security services. How the employees are classified in the IMPLAN model is of particular importance in this study, as the impact on output and disposable income will vary greatly between employment types. Full-time SCE employees and contract workers were classified utilizing an employment mix provided by SCE. Note that employment estimates were provided only for staff that works at the site for an extended period. For short-term services, like an elevator repairman, we used the estimated service wages to calculate the impact that it has on disposable income spending in California. Direct employment related to material spending, fixed costs, and other services expenditures by SONGS is also not included in these job estimates but are reflected in the final results.

Distribution of SONGS Employment

Sectors	2010	2011	2012	2013	2014
Electric Power Generation, Transmission, and Distribution	2,106	1,779	1,599	1,359	1,442
Security Services	492	489	464	390	392
Management, Scientific, and Technical Services	405	314	273	233	256
Facilities Support Services	293	186	147	129	155
Accounting and Payroll Services	215	213	203	170	171
Total Employment	3,511	2,981	2,686	2,281	2,416

Results

The economic activity supported by SONGS is considerable. Outlining the results, indicates, for example, that the plant directly supports $2.2-billion of output and a total output of $3.3-billion. The employment multiplier is well above 2.0, meaning that for each direct job created by SONGS-related activity, indirect and induced impacts will produce more than one additional job in the study area; in total SONGS generates an average of 9,450 jobs per year (over 2010 to 2014) on a full-time equivalent basis (FTEs). In California, average annual wages in 2010 totaled $56,000 and value added per employee is measured at about $135,000 according to IHS Global Insights latest estimates. In comparison, SONGS generates jobs with annual average wages of $84,000 and value added per employee of over $243,000 per year, which is substantially more than the state average. The economic impact of SONGS operation and maintenance is significant, each dollar spent on operation and maintenance of the nuclear plant generates a total of $4.3 in output and $3.0 in value added in the California economy. Each dollar spent on the operation and maintenance of SONGS produces $1.35 of labor income in the California economy, the bulk of which (77%) is employee compensation.

Economic Impacts of the San Onofre Nuclear Plant on California
(Millions of 2010 Dollars, Employment Full Time Equivalent)

	2010	2011	2012	2013	2014	5-Year Avg.
Expenditures	861.71	736.02	712.23	753.06	788.58	770.32
Employment						
Direct	4,442	3,801	3,631	3,436	3,444	3,751
Total	11,520	9,783	9,126	8,314	8,512	9,451
Multiplier	2.59	2.57	2.51	2.42	2.47	2.51
Output						
Direct	2,807.75	2,372.28	2,165.51	1,898.77	1,985.61	2,245.98
Total	4,123.93	3,485.22	3,187.50	2,805.20	2,927.69	3,305.91
Multiplier	1.47	1.47	1.47	1.48	1.47	1.47
Value Added						
Direct	2,125.83	1,799.07	1,635.16	1,420.29	1,489.31	1,693.93
Total	2,873.60	2,431.26	2,215.85	1,935.63	2,024.80	2,296.23
Multiplier	1.35	1.35	1.36	1.36	1.36	1.36
Labor Income						
Employee Compensation	984.32	835.07	769.06	684.92	708.23	796.32
Proprietor's Income	305.73	257.97	234.36	203.62	214.05	243.14
Total Labor Income	1,290.05	1,093.04	1,003.42	888.54	922.28	1,039.46
State and Local Taxes						
Personal Income taxes	43.19	36.59	33.55	29.65	30.81	34.76
Sales Taxes	149.28	126.13	114.28	98.72	103.98	118.48
Corporate Income Taxes	26.30	22.23	20.13	17.37	18.30	20.87
Other Taxes	91.49	77.19	69.55	59.44	63.02	72.14
Total State Taxes	310.26	262.13	237.51	205.18	216.10	246.24